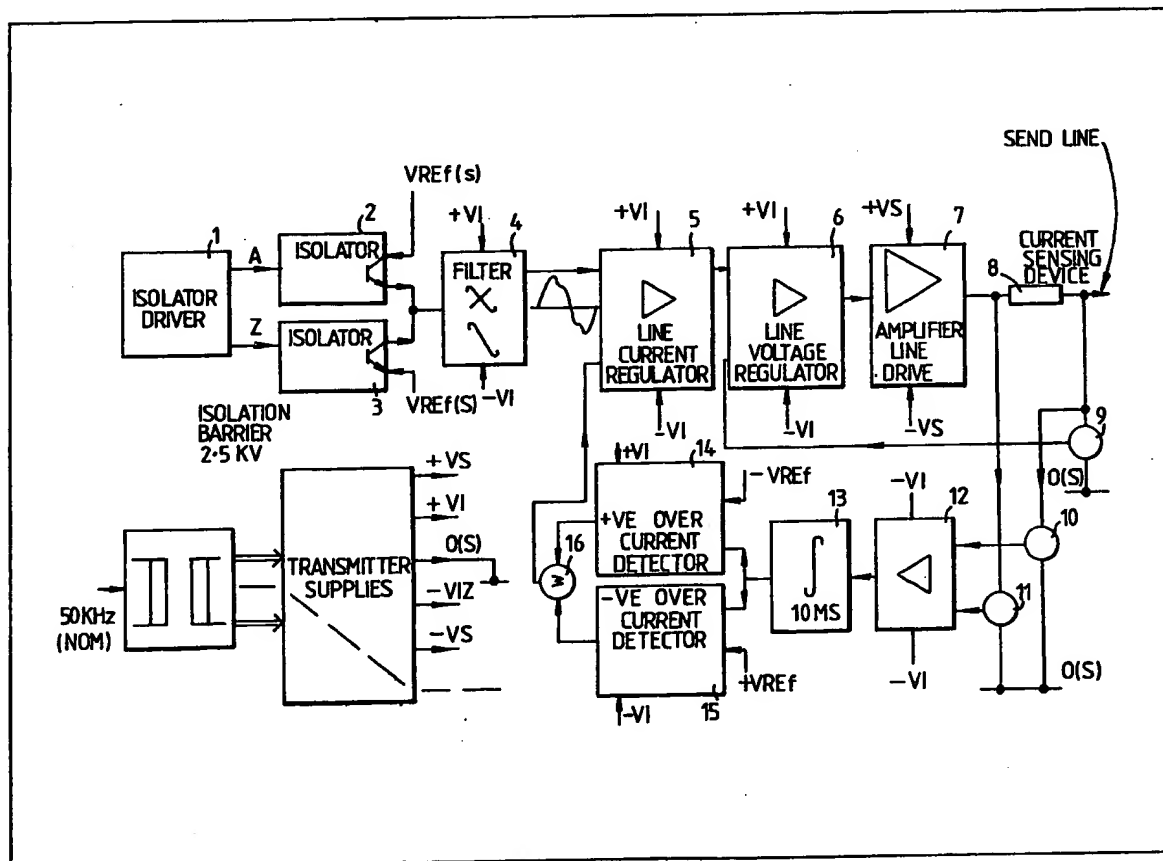


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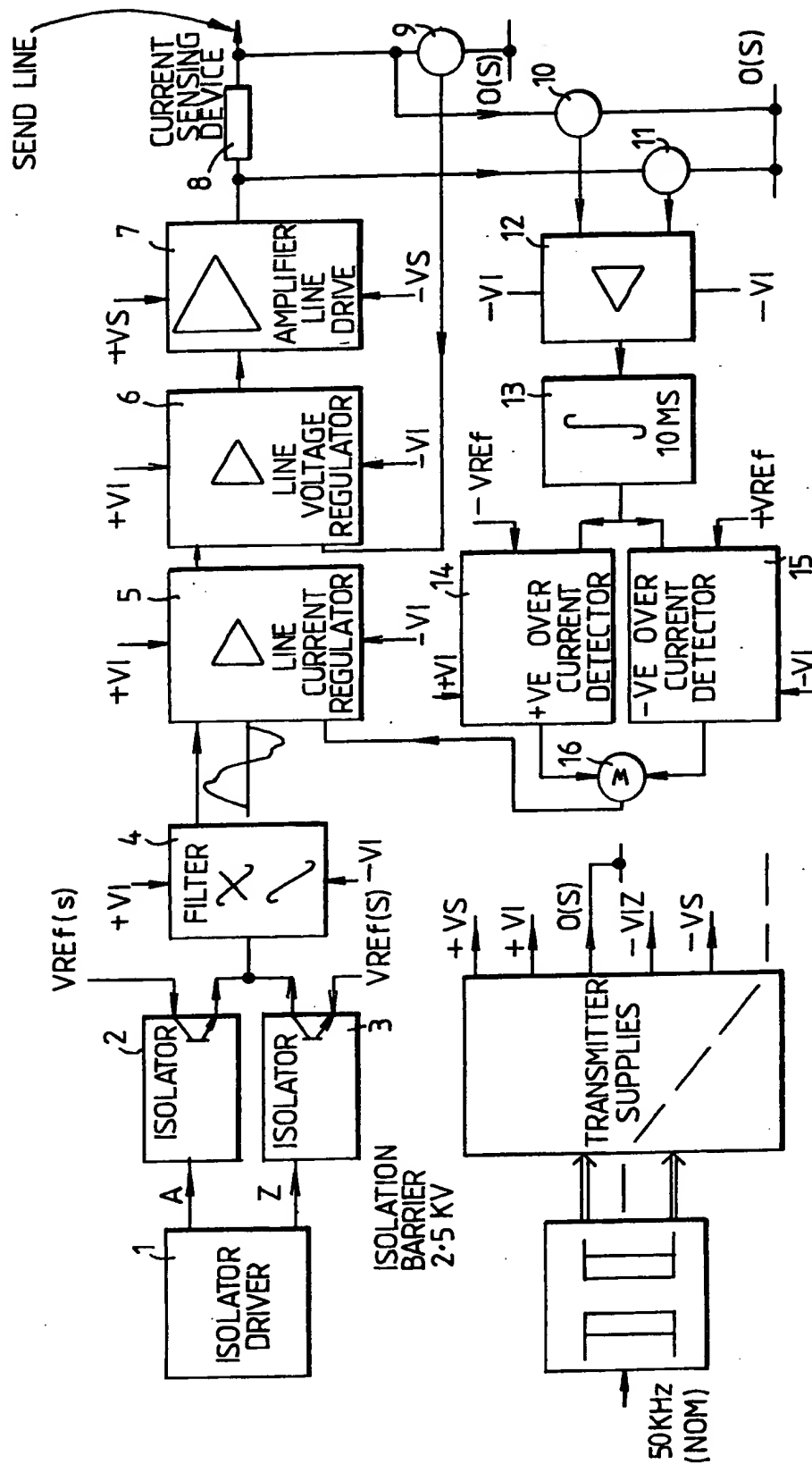
(54) Telegraph transmitter with line isolator

(57) A line isolator for a telegraph transmitter on a double-current line comprises an isolator driver (1), a pair of opto-electronic couplers (2, 3), a filter (4) and a line driver formed by a line current regulator (5), a line voltage regulator (6) and a linear amplifier (7). A current-sensing device (8) provides a feed-back to the line voltage regulator to regulate the line voltage and also forms part of a circuit (10, 11, 12, 13, 14, 15, 16) for limiting the line current in the event of a reduction in line impedance tending to a short-circuit.



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## SPECIFICATION

## Telegraph transmitter with line isolator

5 This invention relates to a telegraph transmitter with line isolator for use on a double-current telegraph line. The purpose of the line isolator is to keep separate the currents and voltages in the local instrument from those in the line while still permitting telegraph signals to be transmitted from the local instrument to the line. One type of line isolator currently in use incorporates a low-pass filter, and a current-limiter in the form of a positive temperature coefficient resistor element housed within an evacuated glass envelope and known as a "barretter". Not only are these components bulky and expensive but, in the case of the barretter, they are becoming increasingly difficult to obtain.

An object of the invention is to provide a simpler and cheaper line isolator.

According to the invention in its broadest aspect there is provided a telegraph transmitter with line isolator for use on a double-current telegraph line comprising an isolation device supplying a switched reference output to a low level active low-pass filter and a line driver including a linear amplifier, the output of which is fed back into the amplifier to regulate the line voltage.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawing in the form of a schematic diagram of a telegraph transmitter with line isolator.

Input signals are applied to an isolator driver 1 having outputs of opposite polarity supplying a pair of isolation devices 2 and 3. These are preferably of the light-emitting diode with phototransistor type providing opto-electronic coupling. Their outputs are supplied to a low level active low-pass filter 4 which produces an overshoot in the output line voltage waveform as indicated in brackets. This ensures correct starting transients. The shaped signals appearing at the filter output 4 are fed to a line driver comprising a line current regulator 5, a line voltage regulator 6 and a high level line drive amplifier 7. The output of the line driver is taken to the send line via a current-sensing device 8 whose purpose will be explained later.

Via a voltage feedback network 9, the voltage on the send line is fed back into the line voltage regulator 6 in order to regulate the line voltage.

Outputs from the two sides of the current-sensing device 8 (typically a resistor) are taken to current-sensing networks 10 and 11 supplying an amplifier 12 and a time delay circuit 13. The output of the latter passes to two over-current detectors 14 and 15 in the form of a pair of diodes with offset. Their output is combined in a summation circuit 16 and fed into the line current regulator 5.

The circuit responsive to the condition sensed by the device 8 has two purposes. In the first place, the sensed circuit is compared to a reference line current limit of, say, 20mA and, should this limit be exceeded for longer than a given period, say, 10 milliseconds, an error signal will be applied to the line current regulator 5 to modify the line voltage

reference signal. The 10 millisecond delay in current limiting is to allow the line driver to charge the line capacitance. The selection of delay time is dependent on the data rate, the characteristics of the line, and the maximum line length to be worked.

The second function is to limit the line current in the event of a reduction in line impedance tending to a short circuit. In these circumstances, the current into the line is limited to a maximum of, say, 60 mA.

As the line impedance for a maximum no-fault steady line current of 20 mA is reduced to zero, the time delay of circuit 13 is reduced from 10 m.s. to zero.

## CLAIMS

1. A telegraph transmitter with line isolator for use on a double-current telegraph line comprising an isolation device supplying a switched reference output to a low level active low-pass filter and a line driver including a linear amplifier the output of which is fed back into the amplifier to regulate the line voltage.

2. A telegraph transmitter as claimed in claim 1, in which a current-sensing device is interposed between the output of the linear amplifier and the line connection and in which the line driver also comprises a line current regulator having a second input from a feedback circuit responsive to the current-sensing device.

3. A telegraph transmitter as claimed in claim 2, in which the current-sensing device is arranged to supply a feedback input to the line current regulator only when the line current in either sense exceeds a predetermined value for a predetermined period.

4. A telegraph transmitter with line isolator for a double-current telegraph line substantially as described with reference to the accompanying drawing.